# GZP6818A

## Pressure Sensor

Analog Output

Datasheet

Version: V1.8

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# Table of Contents

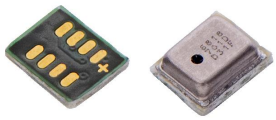
## Document Revision History

| Revision | Describe | Date |
|---|---|---|
| V1.0 | Initial release | 2021.03.22 |
| V1.1 | Modify parameters | 2021.04.30 |
| V1.2 | Update electrical characteristics | 2021.06.09 |
| V1.3 | Add cover and table of contents | 2021.10.29 |
| V1.4 | Adjust product classification | 2022.03.16 |
| V1.5 | Delete company address | 2022.08.29 |
| V1.6 | Template modification | 2023.03.20 |
| V1.7 | Change the application circuit diagram | 2023.09.27 |
| V1.8 | Change Pin Diagram | 2025.03.13 |

# 1 Product Description

The GZP6818A pressure sensor is a compact MEMS pressure sensor designed particularly for a wide applications with various pressure range. It is composed of a silicon piezoresistive pressure sensing chip and a signal conditioning integrated circuit. The initial signal from the sensing chip is amplified, temperature compensated, calibrated and finally converted to a high level analog output voltage that is proportional to the applied pressure.

## 1.1 Features



- Multiple range from 0 ~ 100...2500kPa
- Absolute pressure type
- 3.3V or 5V power supply optional
- Standard voltage output or proportional voltage output optional
- Optional gel filling for waterproof application
- Pressure range can be customized

## 1.2 Application

- Air pump and inflator pump
- Industrial equipment
- Pneumatic control system
- Vacuum system

# 2 Function Description

This product is made with advanced micro-electromechanical principles . The core technology is a MEMS pressure sensor chip based on the silicon piezoresistive effect and a high-performance signal conditioning AISC chip. The silicon micro-piezoresistive MEMS pressure sensor chip outputs a voltage signal proportional to the measured pressure through a Wheatstone bridge composed of four strain-sensitive resistors. The signal is amplified, temperature compensated and linearized by the ASIC chip to obtain an output voltage that is in a prescribed relationship with the applied pressure. The linearity and temperature compensation of the transfer function are realized by the digital processing circuit in the ASIC. Through the polynomial compensation algorithm and multi-point pressure calibration technology at multiple temperatures, high-precision pressure measurement is achieved within the full operating temperature range.

The transfer function of the pressure sensor is created by the following parameters:

- Minimum and maximum pressure ratings
- Voltage values at minimum and maximum rated pressure
- Clamping voltage

All parameters required for a complete calibration algorithm, such as offset, gain, temperature coefficients of offset and gain, and linearity parameters, are determined after calibration and stored in the E²PROM inside the ASIC.

## 2.1 Block Diagram

The sensor functional block diagram is shown in Figure 1.

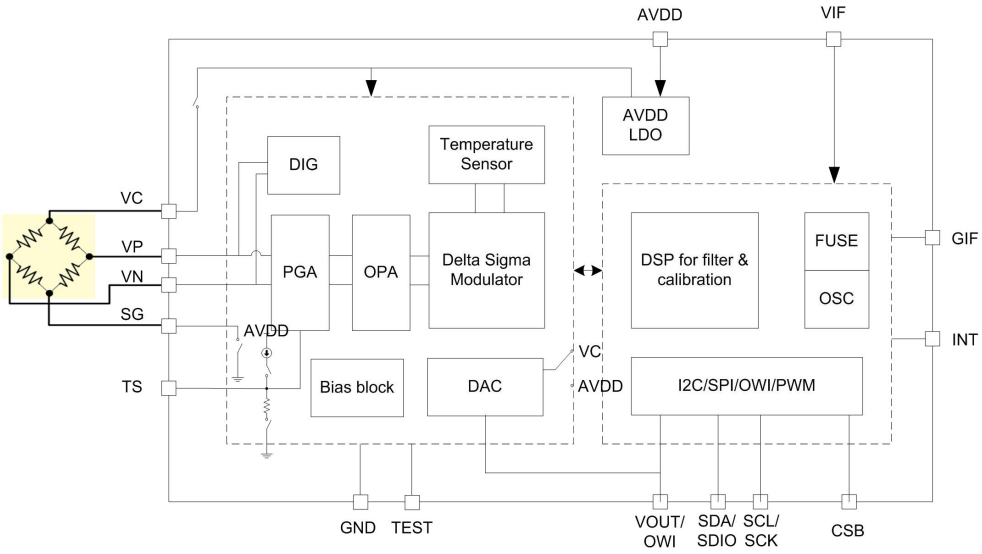



Fig.1 Block Diagram

## 2.2 Pin Definition

The pin diagram is shown in Figure 2.

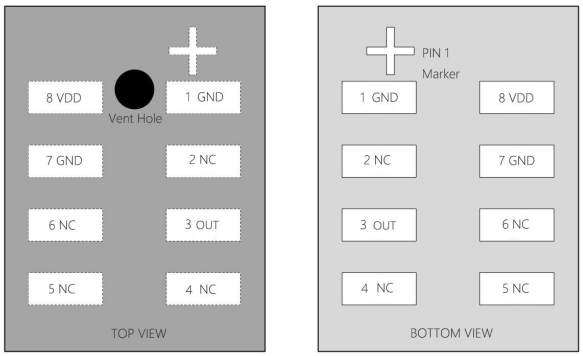



Fig.2 Pin Diagram

Tab.1 Pin correspondence

| PIN No. | Description | Remark |
|---|---|---|
| 1 | GND | Power input negative |
| 2 | NC | Floating pin |
| 3 | Vout | Product output voltage signal |
| 4 | NC | Floating pin |
| 5 | NC | Floating pin |
| 6 | NC | Floating pin |
| 7 | GND | Power input negative |
| 8 | VDD | Power input positive |

## 2.3 Pressure Function

There is a linear transfer relationship between the sensor's output signal and the applied pressure.

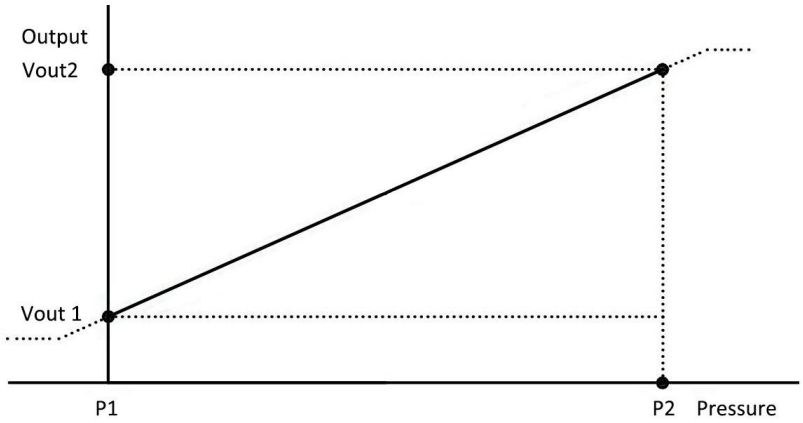



Fig.3 Pressure sensor transfer characteristic curve

The transfer function of the pressure sensor is created by the following parameters:

- Minimum and maximum pressure ratings
- Voltage values at minimum and maximum rated pressure
- Clamping voltage

All parameters required for a complete calibration algorithm, such as offset, gain, temperature coefficients of offset and gain, and linearity parameters, are determined after calibration and stored in the $E^2$PROM inside the ASIC.

Pressure sensor transfer function:

Vout = (K * P + B) @ absolute voltage output, VDD = 5 VDC;

Vout = (K * P + B) @ absolute voltage output, VDD = 3.3 VDC;

Vout = (K * P + B) /5*VDD@ proportional voltage output;

Of which,

Vout : signal output voltage (VDC)

P: Actual pressure (kPa)

P1: Lower limit pressure (kPa)

P2: Upper limit pressure (kPa)

Vout1: Lower limit pressure output (V)

Vout2: Upper limit pressure output (V)

K = (Vout2 - Vout1) / (P2 - P1)

B = (Vout1*P2- Vout2*P1) / (P2 - P1)

| Example Part Number | Pressure range | | Output voltage | | Transfer function coefficients | |
|---|---|---|---|---|---|---|
| | P1 | P2 | Vout1 | Vout2 | K | B |
| GZP6818A40500KPA33Z | 40kPa | 500kPa | 0.2 | 2.7 | 0.0054 | -0.017 |
| GZP6818A40500KPA50K | 40kPa | 500kPa | 0.5 | 4.5 | 0.0087 | 0.152 |
| GZP6818A40500KPA33E | 40kPa | 500kPa | 0.1*3.3 | 0.9*3.3 | 0.0057 | 0.100 |

* Taking 10% to 90% VDD proportional voltage output as example.

## 2.4 Accuracy

The accuracy of the GZP6818A pressure sensor is composed of its linearity, repeatability, and hysteresis errors. The value calculated by the transfer function is the specified value of the sensor and also the theoretical value. The error of the sensor is equal to the difference between the actual output voltage value of the sensor under the specified input pressure and the specified output voltage value.

**Overall accuracy**

The overall accuracy includes more error sources based on the product accuracy:

(1) Pressure drift: The output deviation between the actual output voltage at zero point and full scale and the specified output voltage within the specified pressure range.

(2) Temperature effect: The output deviation of zero point and full scale at different temperatures within the temperature range.

(3) The overall accuracy is expressed by an error band, which consists of three line segments. The data are shown in Figure 4 and Table 2.

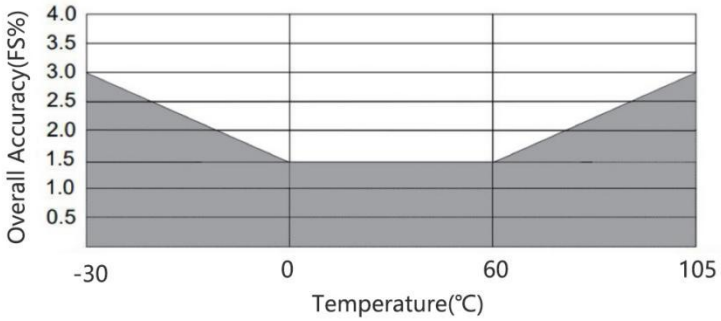



Fig.4 Relationship between overall accuracy and temperature

Tab.2 Overall accuracy table

| **Temperature(°C)** | **Overall accuracy (Full Span)** |
|---|---|
| -30~105 | ±3.0% |
| 0~60 | ±1.5% |

*Different pressure ranges have different overall accuracy, please consult customer service for more details.

# 3 Technical Specifications

Measured at a power supply of (5±0.25)V DC and a temperature of 25°C

## 3.1 Maximum Ratings

The maximum rated parameters of the sensor are shown in Table 3.

Tab.3 The maximum rated parameters of the sensor

| **Parameter** | **Min.** | **Typ.** | **Max.** | **Unit** | **Remark** |
|---|---|---|---|---|---|
| Maximum voltage | | | 6.5 | V | |
| Output current load | | | 5 | mA | |
| ESD Protection | | ±2 | | KV | |
| Operating temperature | -30 | | 105 | °C | |
| Storage temperature | -40 | | 125 | °C | |

*Long exposure at the specified limits may cause degradation to the device.

## 3.2 Performance Indicators

The sensor performance indicators are shown in Table 4.

Tab.4 Sensor performance indicators

| Parameter | Value | Unit |
|---|---|---|
| Pressure range | 0 ~ 100…2500 | kPa |
| Output signal | 0.5-4.5 ( Customizable ) | V |
| Accuracy | ±1 | %Span |
| Overload pressure | 2× (Range ≤ 350kPa) | Rated |
| | 1.5× (Range>350kPa) | |
| Burst pressure | 3× (Range ≤ 350kPa) | |
| | 2× (Range>350kPa) | |
| Compensation temperature | 0 ~ 60 (Customizable) | °C |

1. The 0.5~4.5V output voltage is based on 5V power supply or optional 0.2~2.7V output based on 3.3V power supply. The output can be customized to other voltage range by order.

2. The different pressure range may have different accuracy, overload and burst pressure , please consult Sencoch for more details.

## 3.3 Electrical Characteristics

The electrical characteristics of the sensor are shown in Table 5.

Tab.5 The electrical characteristics

| Parameter | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|
| Supply voltage | 3 | | 5.5 | V | |
| Working current @25°C | | 1700 | | uA | |
| Filter capacitor | | 100 | | nF | |
| PSRR | | 60 | | dB | |
| Output current load | | | 5 | mA | |
| Input common mode signal rejection ratio | 80 | 110 | | dB | |
| Short circuit current limiting | 15 | 20 | 25 | mA | |
| Upper clamp voltage | 3/4 | | 1 | VDD | |
| Lower clamping voltage | 0 | | 1/4 | VDD | |

# 4 Application Circuit

Figure 5 is for the recommended application circuit of the chip.

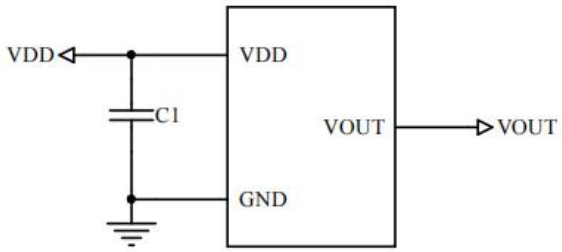


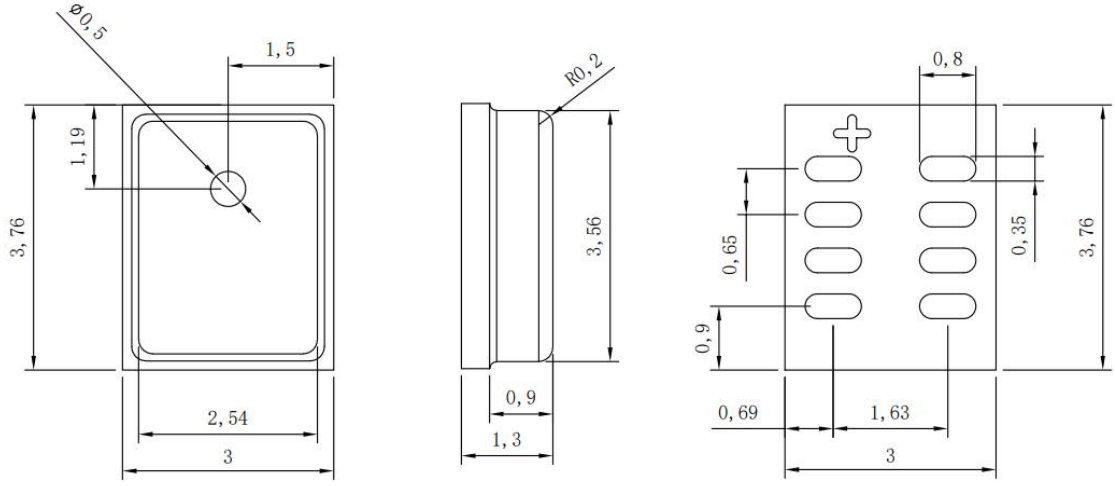

Fig.5 Application circuit

**Notice:**

- The recommended value of C1 is 100nF. Please confirm the electrical definition before assembly.
- Do not have any electrical connection to the NC pin, otherwise it may cause product failure.
- Provide anti-static protection during welding
- Overload voltage (6.5Vdc) may burn out the circuit chip
- This product has no reverse connection protection, please pay attention to the power polarity during assembly

# 5 Appearance and Structure

The sensor dimensions refer to Figure 6. ( Error ±0.1mm if not specified )




Front view Side view Bottom view

Fig.6 Sensor Dimensions

Recommended footprint as Figure 7.

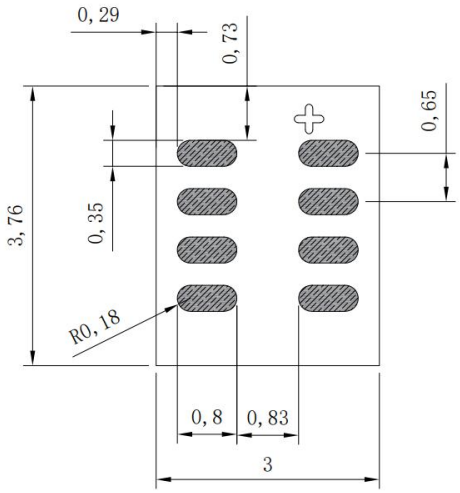



Fig.7 Recommended Footprint

# 6 Order Guide

## 6.1 Common Range Order Guide

GZP 6818A G1 50400KPA 50K B01 WX

Tab.6 Order Guide

| | |
|---|---|
| GZP | Pressure Sensor Series |
| 6818 | Product Series |
| A | Output type A: Analog output D: IIC output |
| G1(Optional) | Protection Type G1: Gel filling |
| 50400KPA | Pressure range: 50400 means the minimum pressure (50) and the maximum pressure (400)<br>Pressure unit: KP: KPa MP :MPa PS: PSi BA:Bar<br>Pressure Type: A: Absolute<br>Therefore, 50400KPA means the absolute pressure of 50KPA to 400KPA |
| 50 | Power supply 50: 5 Vdc; 33 : 3.3Vdc |
| K | Output K: 0.5~4.5 V Z : 0.2~2.7V H:0.2~4.7V<br>E: Proportional voltage output (note the output voltage range after the model) |
| B01 | Packing method B01: Taping |
| WX | Company interior code |

### 6.2 Custom Range Order Guide

GZP 6818A G1 A017 T014 B01 WX

Tab.7 Selection Guide

| | |
|---|---|
| GZP | Pressure Sensor Series |
| 6818 | Product Series |
| A | Output type A: Analog output D: IIC output |
| G1 (Optional) | Protection Type G1: Gel filling |
| A017 | Pressure range A017: 21.336~101.336kPa<br>For other custom range codes, please consult the manufacturer. |
| T014 | Power supply, output T025 0.76~4.64V@5V<br>For other custom power supplies and output codes, please consult the manufacturer. |
| B01 | Packing method B01: Taping |
| WX | Company interior code |

## 7 Model Example

Tab.8 Model example

| | **Pressure range** | **Model** | **Power supply/output** |
|---|---|---|---|
| Common range output | 0 ~ 700kPa | GZP6818A00 700KPA33Z B01WX | 0.2~2.7V@3.3V |
| | 40 ~ 500kPa | GZP6818A40 500KPA50K B01WX | 0.5~4.5V@5.0V |
| | 101.3 ~ 1570kPa | GZP6818A00 1570KPA50K B01WX | 0.5~4.5V@5.0V |
| Custom range output | 20~100kPa | GZP6818A-A016-T014-B01WX | 0.4791~3.9271V@5.0V |
| | 20~100kPa | GZP6818A-A016-T103-B01WX | 0.5~4.7V@5.0V |
| | 20~115kPa | GZP6818A-A063-T066-B01WX | 0.79~4.54 @5.0V |
| | 20~120kPa | GZP6818A-A161-T127-B01WX | 0.88~4.88 @5.0V |
| | 21.336~101.336kPa | GZP6818A-A017-T025-B01WX | 0.76~4.64V@5.0V |
| | 45~350kPa | GZP6818A-A019-T032-B01WX | 0.5~4.47V@5.0V |

1. Above model example is for order information only, contact Sencoch for production and stock status.

2. For more customized ranges and special parameter part numbers, please consult Sencoch or agents.

# 8 Instruction for Use

## 8.1 Soldering

Since this product has a small structure with low heat capacity, please minimize the influence of heat from the outside. Otherwise, it may be damaged due to thermal deformation and cause changes in characteristics. Please use non-corrosive rosin type flux . In addition, since the product is exposed to the outside, please be careful not to allow flux to penetrate into the inside.

( 1) Manual soldering

- Please use a soldering iron with a head temperature of 260 to 300°C (30 W) and perform the work within 5 seconds.
- When soldering with a load applied to the terminals, please be careful as the output may change.
- Please keep the soldering iron tip clean.

( 2) Reflow soldering (SMD terminal type)

To avoid zero drift after reflow, it is recommended to use low temperature solder paste for reflow oven. The temperature setting conditions are as follows:

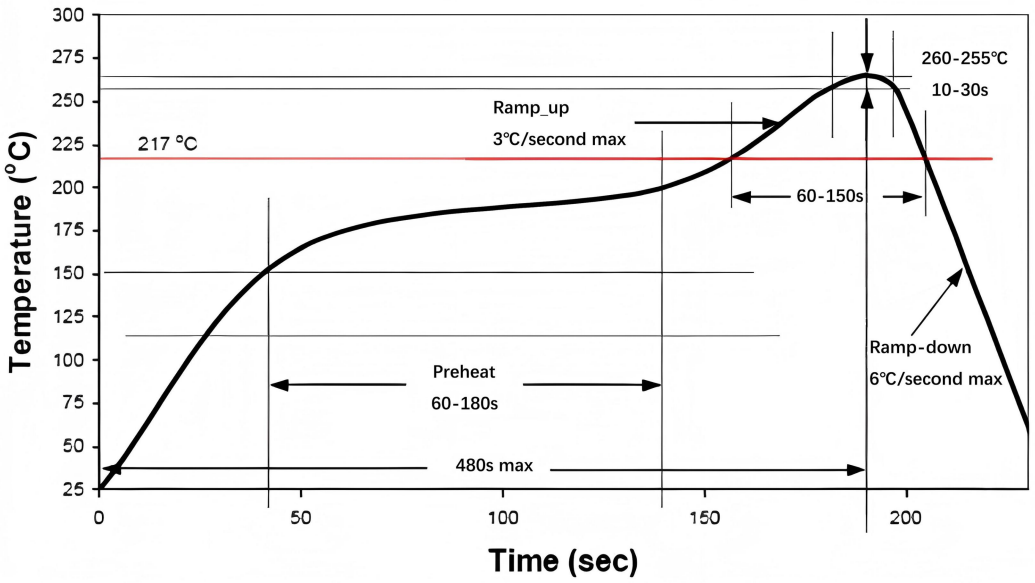



Fig.8 Reflow soldering

(3) The warping of the printed circuit board relative to the entire sensor should be kept below 0.05mm. Please manage this.

(4) When cutting and bending the substrate after mounting the sensor, be careful not to cause stress on the soldered parts .

(5) Since the sensor terminals are exposed, if metal pieces touch the terminals, abnormal

output may occur. Be careful not to touch them with metal pieces or your hands.

(6) When coating is applied after soldering to prevent insulation degradation of the substrate, be careful not to allow chemicals to adhere to the sensor surface.

## 8.2 Cleaning requirements

(1) Since this product is an open type, be careful not to allow cleaning fluid to enter the interior.

(2) Please avoid using ultrasonic cleaning as it may cause product failure.

## 8.3 Storage and transportation

(1) This product is not drip- proof, so do not use it in locations where it may be splashed with water.

(2) Do not use the product in an environment where condensation occurs. If moisture attached to the sensor chip freezes, it may cause a change in sensor output or damage the sensor.

(3) Due to the structure of the pressure sensor chip, the output will change when it is exposed to light. Especially when applying pressure through a transparent cover, etc., please avoid light from reaching the sensor chip.

(4) Normally packaged pressure sensors can be transported by ordinary transportation tools. Please note: The product should be protected from moisture, impact, sunburn and pressure during transportation.

## 8.4 Other precautions for use

(1) Incorrect installation methods may cause accidents, so please be careful.

(2) Avoid using the product in a manner that applies high-frequency vibration, eg.ultrasonic waves.

(3) The only pressure medium that can be used directly is dry, non-corrosive gas(Gel fill series is resist-moisture). Other media, especially corrosive media or media containing foreign matter, may cause malfunction and damage. Therefore, please avoid using it in the above environment.

(4) A pressure sensor chip is located inside the pressure inlet. If a needle or other foreign object is inserted into the pressure inlet, the chip may be damaged or the inlet may be blocked, so please avoid such operations. Also, please avoid blocking the air inlet during use .

(5) Please use the product within the rated pressure range. Using the product outside the rated pressure range may cause damage.

(6) Since static electricity may cause damage, please be careful to ground charged objects

on the table and workers when using it to safely discharge static electricity in the surrounding area.

(7) Please pay full attention to the fixing and selection of the product, sleeve, and introduction tube according to the pressure used.

(8) Since this specification is for a single product, in order to improve reliability during actual use, please confirm the performance and quality under actual use conditions.

# 9 Packaging Information

Reel&Tape information as shown in Figure 10. (Unit: mm) Quantity per tray 3000 PCS.

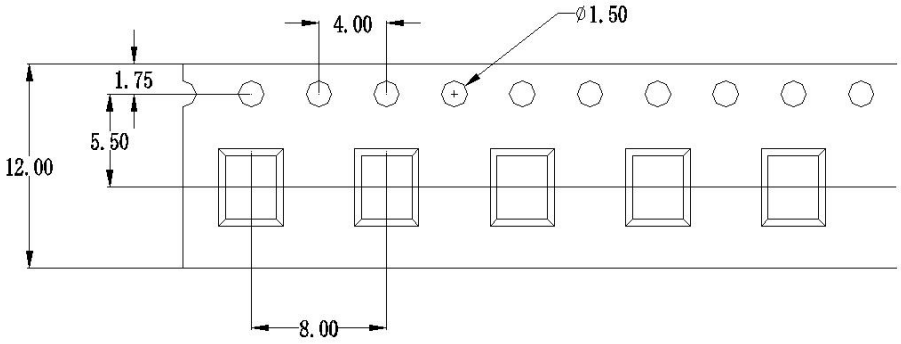



Fig.9 Carrier tape

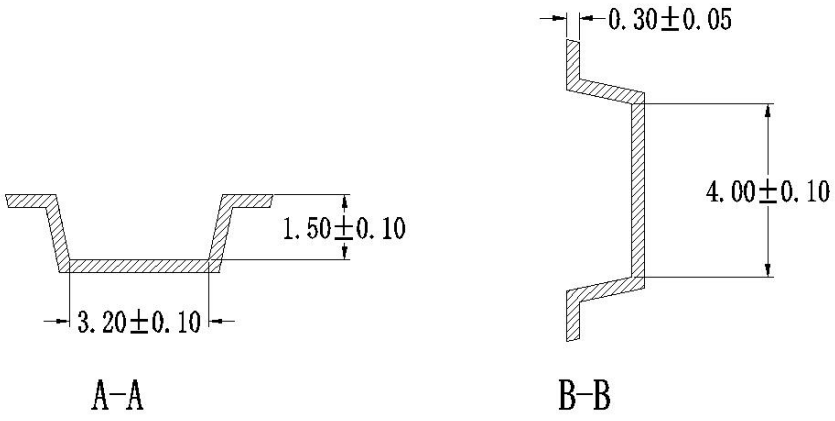



Fig.10 Detail of the carrier pocket

# Safety Precautions

This product is made of semiconductor components for general electronic equipment (communication equipment, measuring equipment, working machinery, etc.). Products using these semiconductor components may malfunction and fail due to external interference and surges, so please confirm the performance and quality under actual use. To be on the safe side, please perform safety design on the device (setting of protection circuits such as fuses and circuit breakers, multiple devices, etc.) so that life, body, property, etc. will not be harmed in the event of a malfunction. To prevent injuries and accidents, please be sure to comply with the following matters:

·The driving current and voltage should be used below the rated values.

Please wire according to the electrical definition . In particular, reverse connection of the power supply may cause accidents due to circuit damage such as heat, smoke, and fire, so please be careful.

·Be careful when fixing the product and connecting the pressure inlet .

# Warranty and Disclaimer

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